BOVINE TRYPANOSOMOSIS IN NORTH PROVINCE OF CAMEROON

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Abstract

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The results of the examination of 2959 bovine blood samples collected from four divisions of North Province of Cameroon showed a prevalence of 1.72 for *T. brucei*, 0.98 for *T. congolense* and 4.03 for *T. vivax* using parasitological techniques, such as the buffy coat technique (BCT) and the microhaematocrit centrifugation technique (MHCT). Prevalence rates in tsetse infested areas were higher than in tsetse free areas for *T. brucei* and *T. congolense*, but not for *T. vivax*. The Antigen ELISA was used to detect trypanosomal antigens in serum samples of a subset of the same animals. By using the Ag-ELISA many more animals were detected positive for *T. brucei* and *T. vivax*, but not for *T. congolense*, than when just the two parasitological techniques were used. As a matter of fact 90% of the *T. brucei* infections were detected by the Ag-ELISA and 10% by using either the BCT or the MHCT.

1. INTRODUCTION

Tsetse eradication campaigns have been carried out in the three northern provinces of Cameroon since 1967. At present the region contains two entomological situations: tsetse infested areas and tsete free areas. The present study had two objectives. The first objective was to draw up a map of bovine trypanosomosis in Northern Cameroon. The second objective was to monitor the tsetse eradication campaign by comparing the various prevalence rates of trypanosomosis in cattle from tsetse free areas with those from tsetse infested areas. The present study reports results obtained in the North Province.

2. MATERIALS AND METHODS

The North Province includes 14 subdivisions organized in 4 divisions (Figs 1 and 2). Cattle were examined for the presence of trypanosomes in blood and for trypanosomal antigens in serum samples [1, 2]. The number of cattle bled was stratified by administrative region, with the provincial subdivision being the stratum for the study. A random-cluster sampling scheme was used to select the herds in each subdivision.

As parasitological techniques the microhaematocrit centrifugation technique (MHCT), the buffy coat technique (BCT) and Giemsa-stained smears were used [3, 4]. The Antigen ELISA provided by the Joint FAO/IAEA Division was used as a serological technique. All serum samples collected in the field were labelled with a two-line code indicating in line one the division (two characters) and the subdivision (two characters) and in the second line the herd (a two-figure number) and the animal (a three-figure number) as an indication of the order they were bled (Table I). Thus, the study is creating a large serum bank, which will be available for investigations of other diseases. Serum bank sample numbers were computerized in a dBase III Plus database file including additional information on geographical details,

TABLE I. EXAMPLE OF THE CODING SYSTEM USED FOR IDENTIFYING SAMPLES IN THE SERUM BANK

Code	Significance
BE-GA	From the Garoua Subdivision in the Benue Division
02-045	Serum sample collected from 45th animal bled in the 2nd herd visited

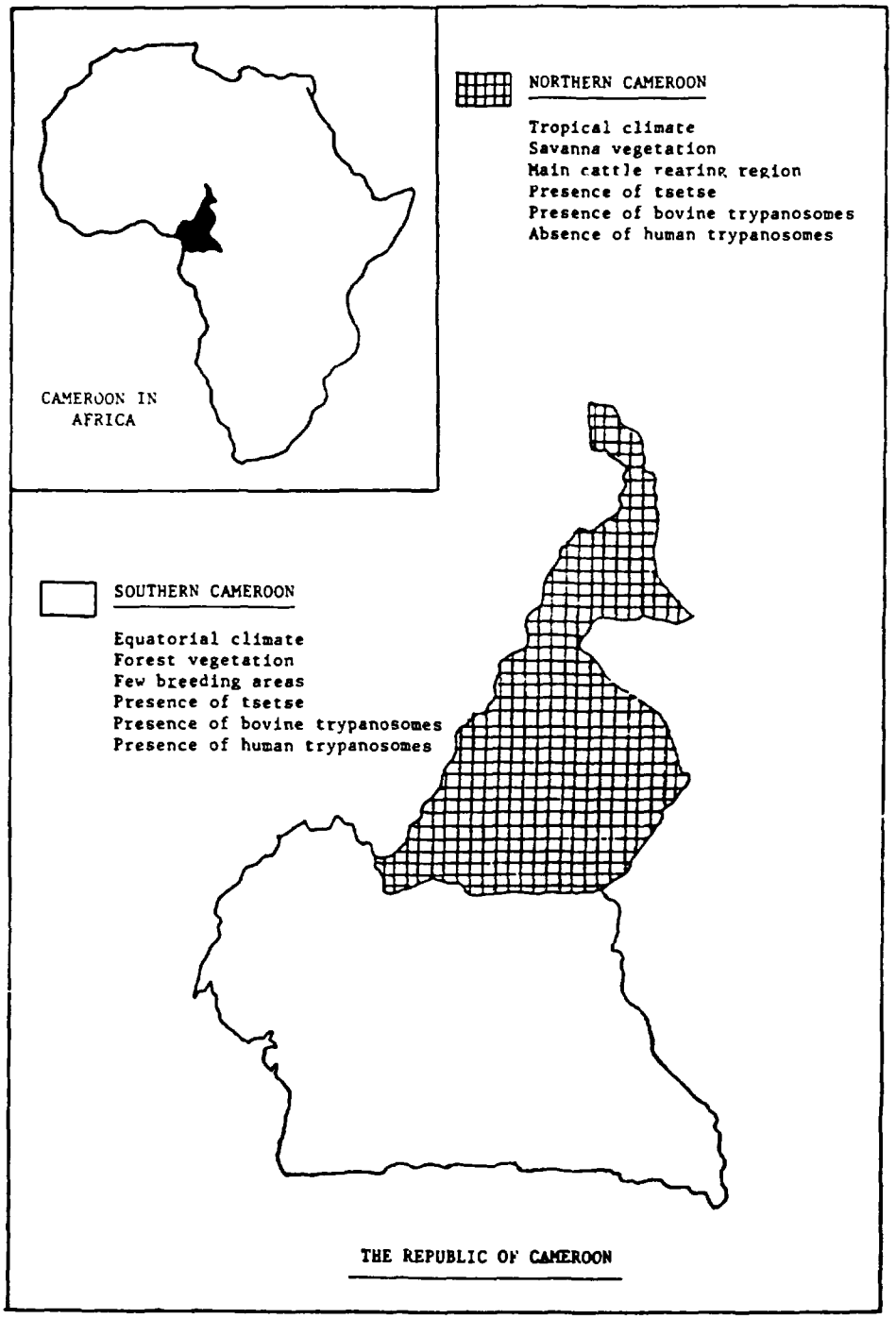

FIG. Ia. Map of Cameroon showing some differences between the southern and northern parts of the country.

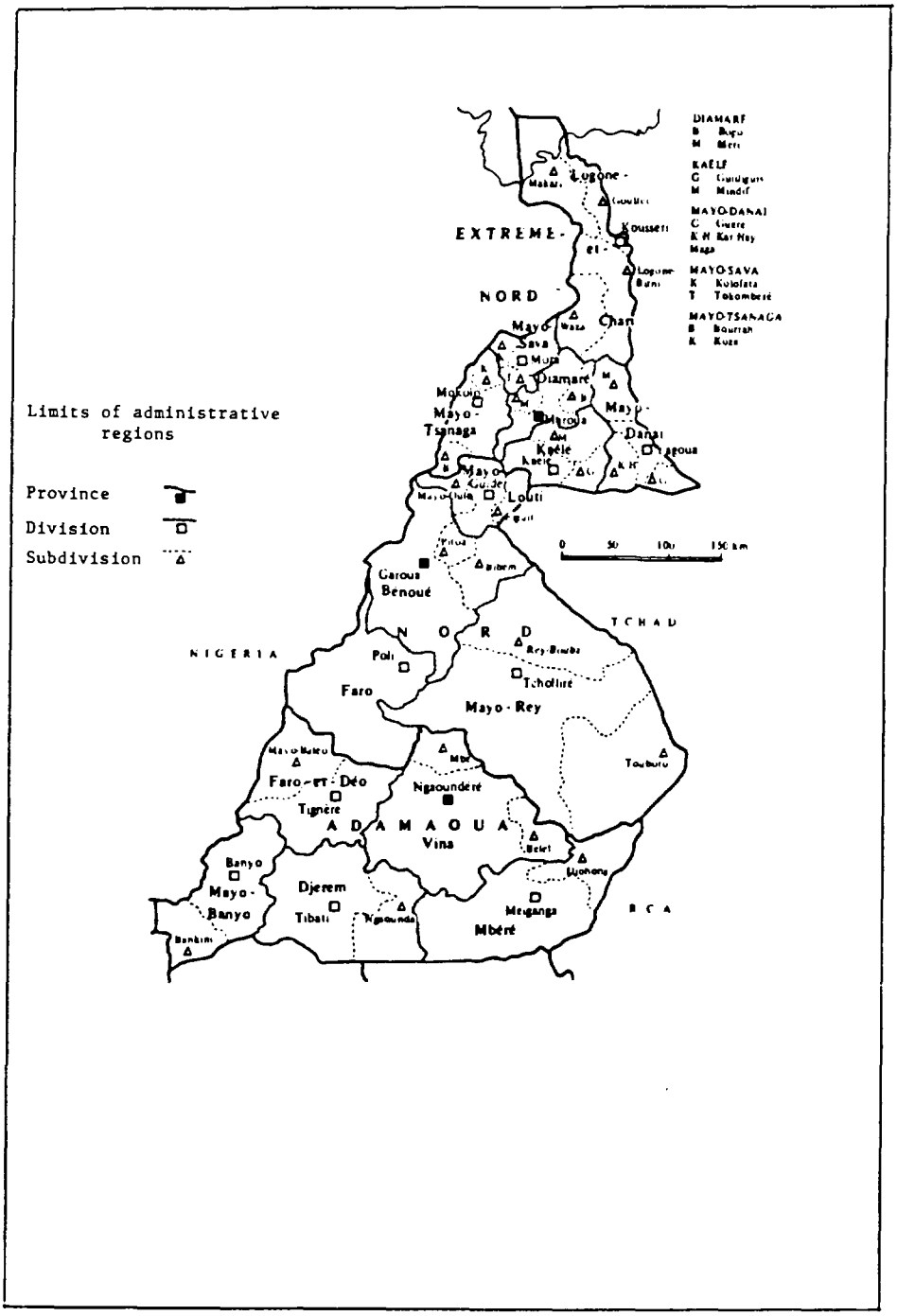

FIG. 1b. Administrative map of Northern Cameroon.

animal characteristics (such as sex, age, trypanocidal drug details [5], behaviour of the animal), entomological (presence/ absence of tsetse), parasitological (packed red cell volume [PCV], MHCT, BCT and stained smear values) and serological results (percent positive [PP] values).

3. RESULTS

3.1. Parasitological results

A total number of 2 959 cattle were examined from November 1994 to January 1995. Using the BCT and MHCT techniques overall prevalence rates were detected for *T. brucei*, *T. congolense* and *T. vivax* of 1.72 %, 0.98 % and 4.03 %, respectively. When considering only the tsetse free areas prevalence rates of less than 1% were detected for *T. brucei* and *T. congolense*, while for *T. vivax* the prevalence rate was 3.87% (Table II).

TABLE II. TRYPANOSOME PREVALENCE RATES IN TSETSE FREE AREAS

	MHCT & BCT					
	Positive		Negative		Total	
Trypanosome species	No.	%	No.	%	No.	%
T. brucei	11	0.69	1590	99.31	1601	100
T. congolense	2	0.12	1599	99.88	1601	100
T. vivax	62	3.87	1539	96.13	1601	100

BCT = buffy coat technique; No. = number of animals
MHCT = microhaematocrit centrifugation technique

When the prevalence rates were considered for the tsetse infested areas, they were relatively low for the three trypanosome species involved, being 3 % for *T. brucei*, 2 % for *T. congolense* and 4 % for *T. vivax* (Table III).

TABLE III. TRYPANOSOME PREVALENCE RATES IN TSETSE INFESTED AREAS

	MHCT & BCT					
	Positive		Negative		Total	
Trypanosome species	No.	%	No.	%	No.	%
T. brucei	40	2.95	1315	97.05	1355	100
T. congolense	27	1.99	1328	98.01	1355	100
T. vivax	57	4.21	1298	95.79	1355	100

BCT = buffy coat technique; No. = number of animals.
MHCT = microhaematocrit centrifugation technique.

3.2. Antigen ELISA results

Antigen ELISA results can be presented from two of the four divisions that have been sampled in North Province (Table IV). One of the divisions is considered to be tsetse free (Mayo-Louti), while the other one (Mayo-Rey) is infested with tsetse flies. An animal was considered positive if either the MHCT,

the BCT or the Ag-ELISA gave a positive result. Comparisons between the three techniques were made. When comparing the Antigen ELISA technique with the two parasitological techniques (BCT and MHCT), it appeared that the use of the Ag-ELISA increased the sensitivity of the diagnosis of *T. brucei* and *T. vivax* infections in cattle. On the other hand, the sensitivity of the diagnosis of *T. congolense* infections was not increased by using the Ag-ELISA (Table IV).

TABLE IV. COMPARISON OF THE SENSITIVITY (%) OF TWO PARASITOLOGICAL TECHNIQUES (BCT AND MHCT) WITH THE ANTIGEN ELISA

	Mayo-Louti (tsetse free area) n = 627		Mayo-Rey (tsetse infested area) n = 616	
Trypanosome species	Positive by BCT MHCT	Positive by BCT MHCT ELISA	Positive by BCT MHCT	Positive by BCT MHCT ELISA
T. brucei	0.64 (4*)	5.58 (35)	0.65 (4)	6.01 (37)
T. congolense	0.16 (1)	0.16 (1)	1.95 (12)	1.95 (12)
T. vivax	5.26 (33)	8.93 (56)	1.79 (11)	5.03 (31)

n = number of animals examined.
* between brackets: the number of animals detected positive.
BCT = buffy coat technique.
MHCT = microhaematocrit centrifugation technique

When comparing the two parasitological techniques, the BCT appeared to be more sensitive than the MHCT. Nevetheless, the MHCT was a useful diagnostic method as it allowed to detect some buffy coat-negative animals, in particular cattle infected with *T. brucei* (17.65%). More than half of the animals infected with *T. brucei* or *T. congolense* were detected using both the MHCT and the BCT. On the contrary, only 38% of the cattle infected with *T. vivax* could be detected using parasitological techniques (Table V).

TABLE V. COMPARISON OF THE NUMBER OF SAMPLES DETECTED POSITIVE USING TWO PARASITOLOGICAL TECHNIQUES (MCHT and BCT)*

Trypanosome species	MHCT	BCT	MHCT & BCT	Total
T. brucei	9 (17.65%)†	13 (25.49%)	29 (56.86%)	51 (100%)
T. congolense	2 (6.90%)	11 (37.93%)	16 (55.17%)	29 (100%)
T. vivax	3 (2.50%)	70 (58.33%)	46 (38.33%)	119 (100%)

* Total number of samples examined = 2959.
† = between brackets: the percentage of samples detected positive with the technique as compared to the total number of samples found infected with the particular trypanosome species.
BCT = buffy coat technique.
MHCT = microhaematocrit centrifugation technique.

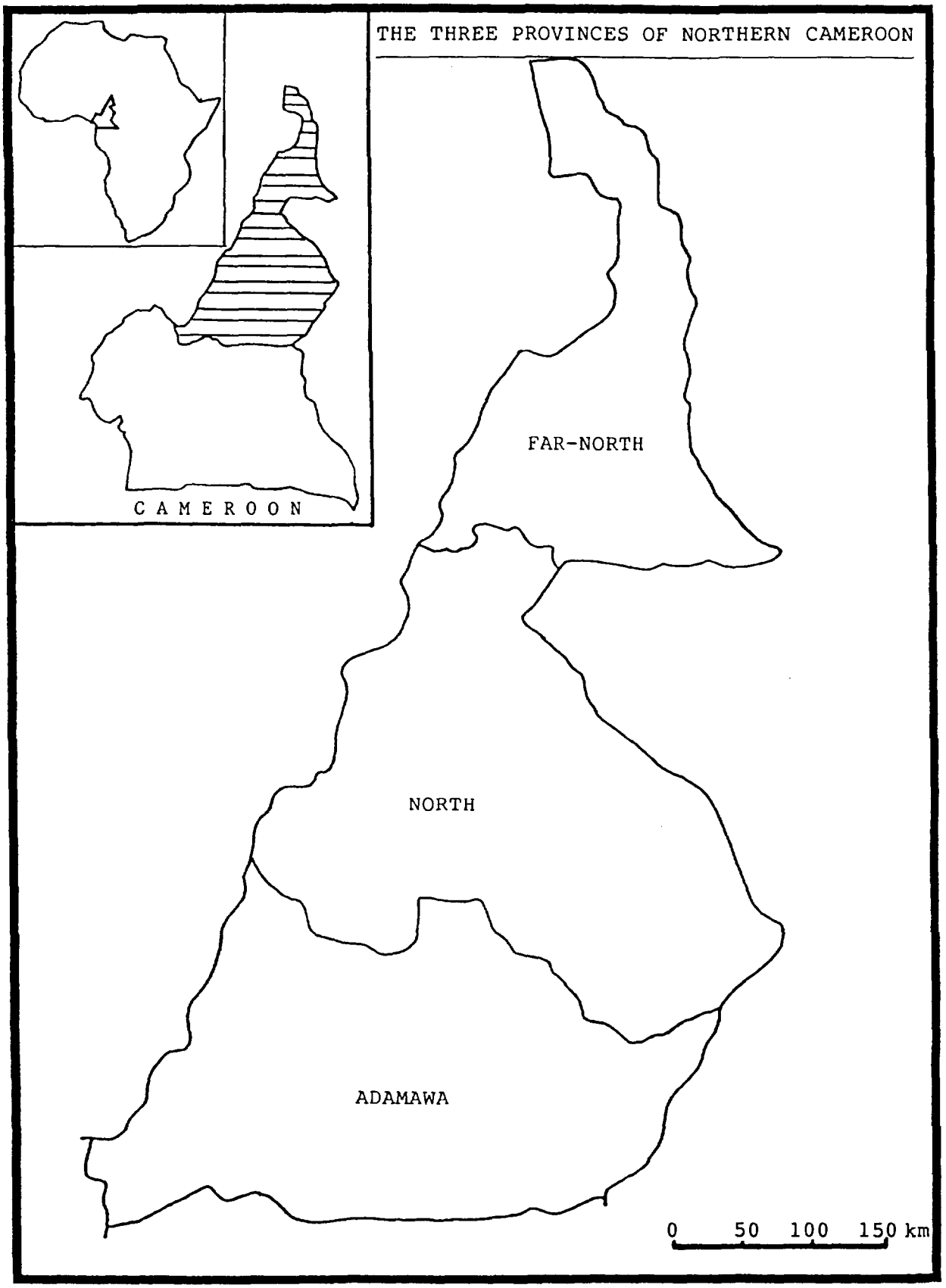

FIG. 2. Map showing the three provinces of Northern Cameroon

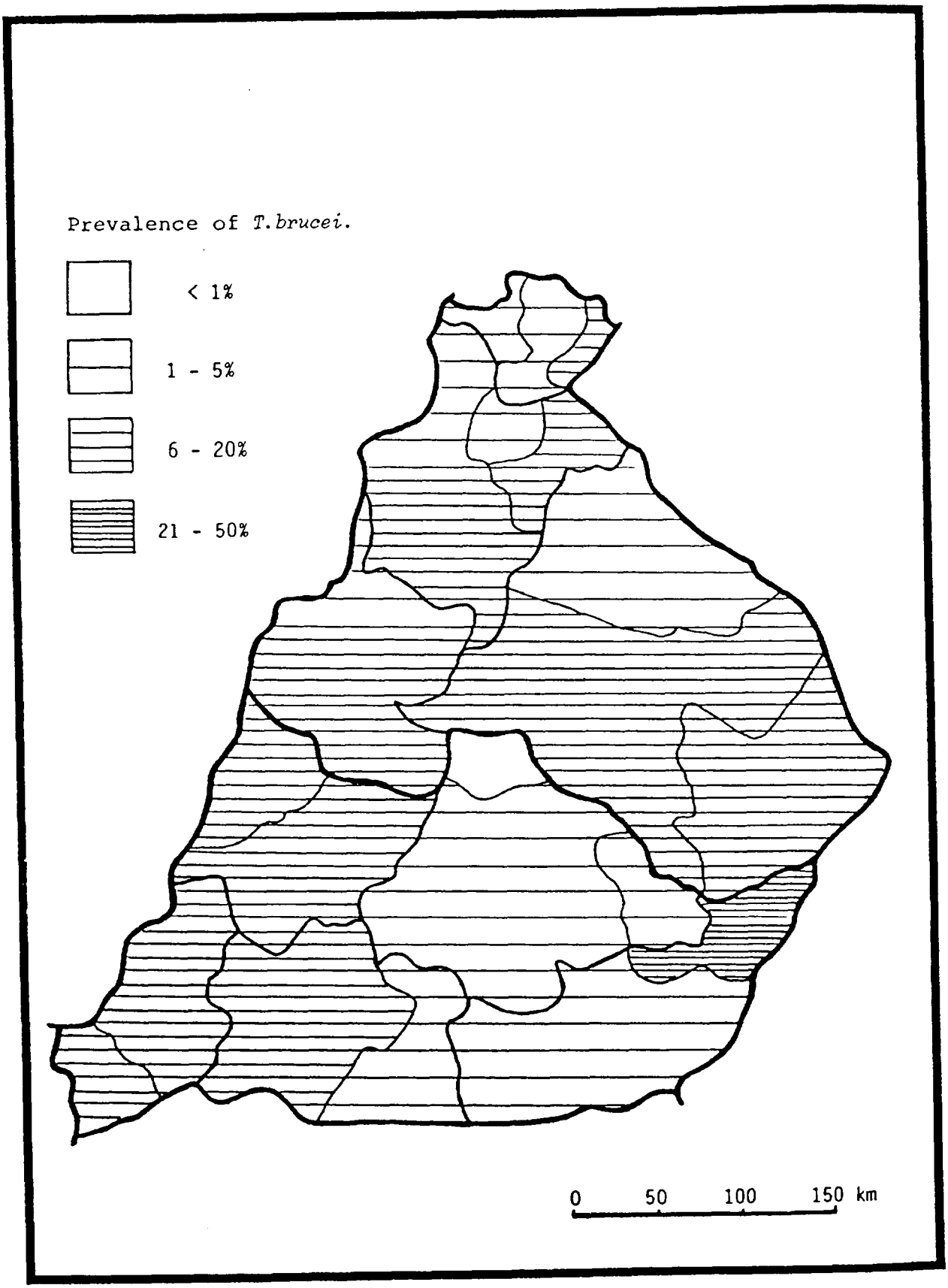

FIG. 3. Map showing the prevalence of Trypanosoma brucei in Adamawa and North Province in 1995.

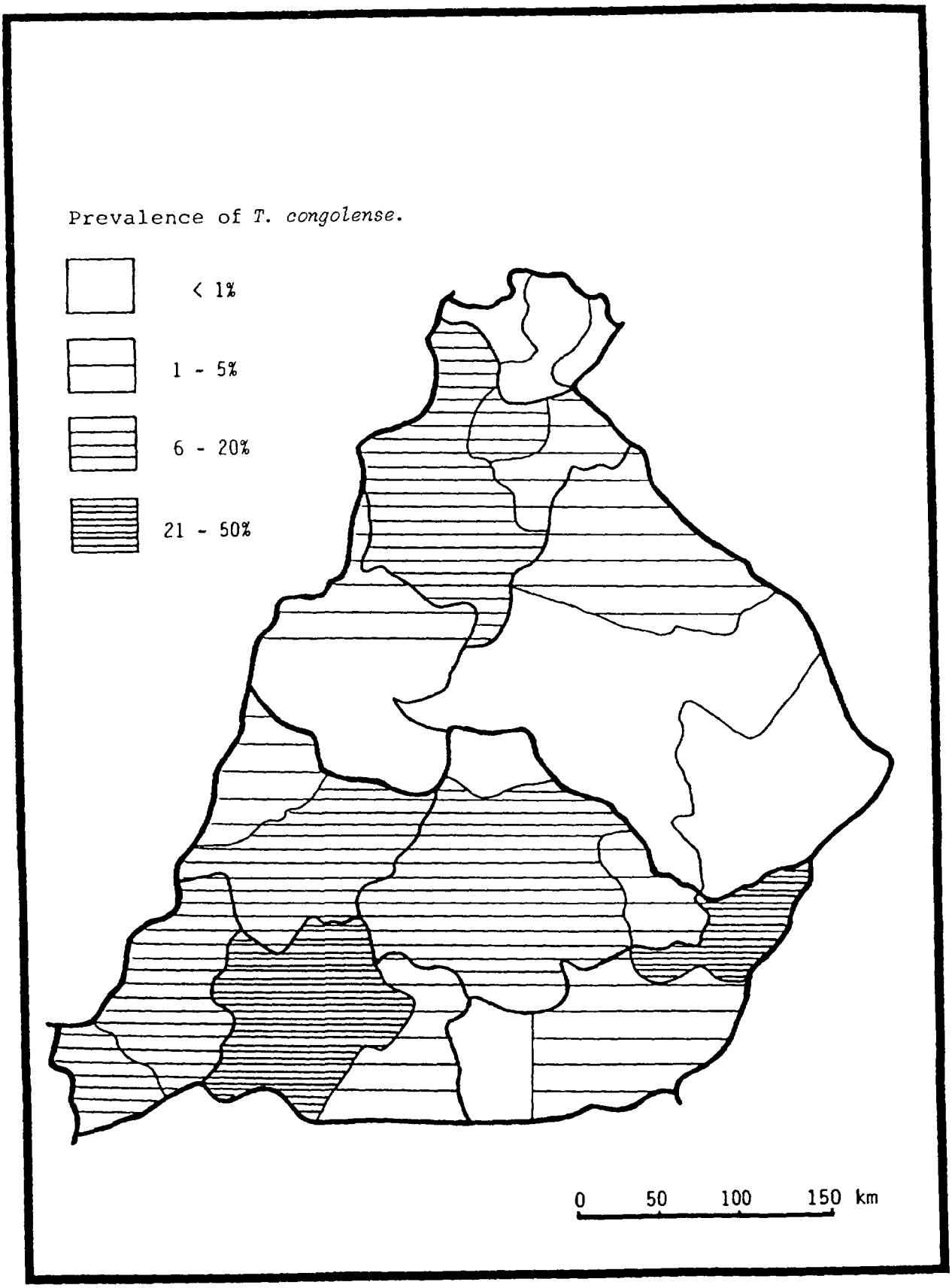

FIG. 4. Map showing the prevalence of Trypanosoma congolense in Adamawa and North Province in 1995.

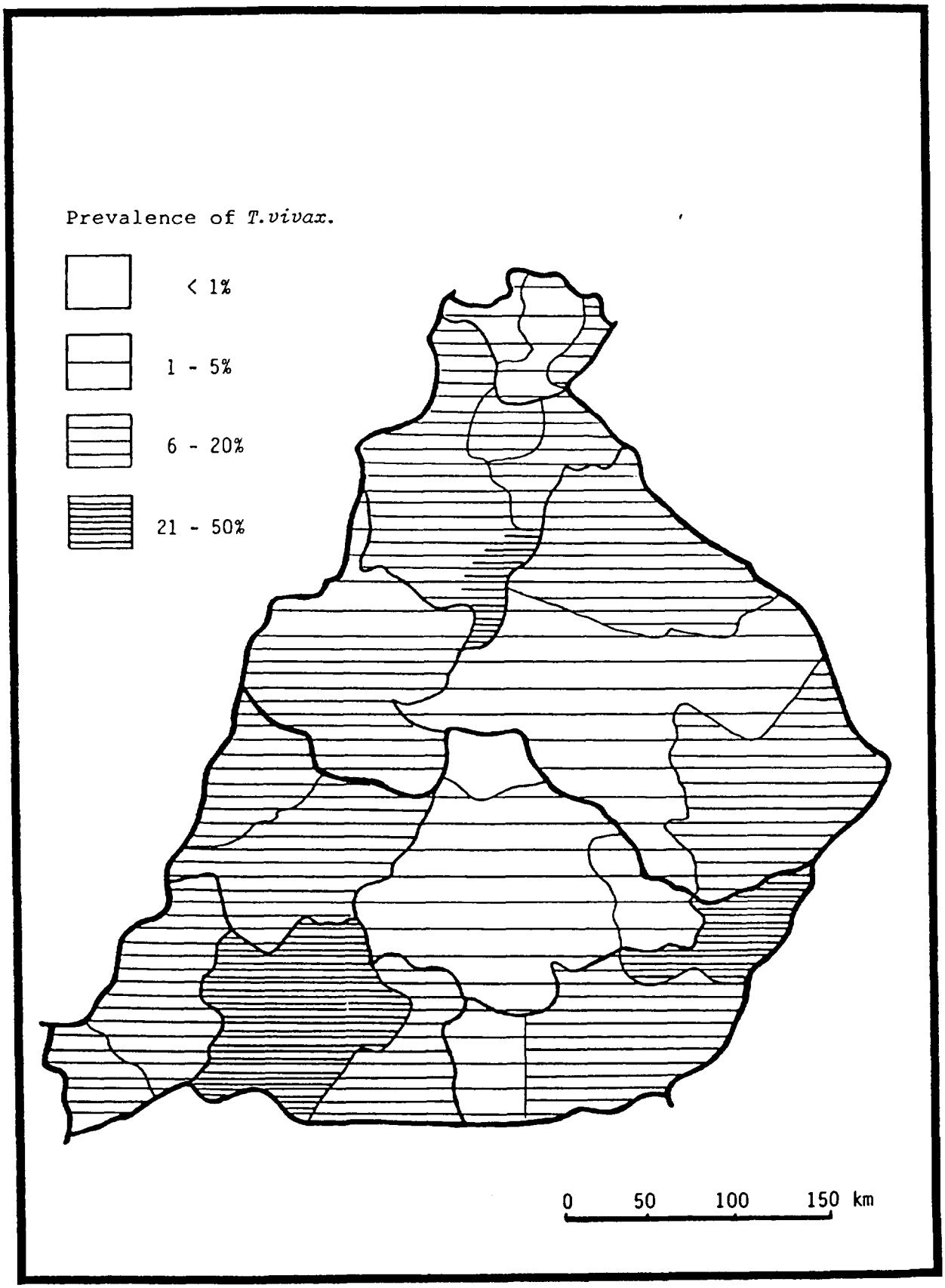

FIG. 5. Map showing the prevalence of Trypanosoma vivax in Adamawa and North Province in 1995.

When comparing the parasitological techniques with the Antigen ELISA few samples detected positive with the former technique could be confirmed with the latter test. For example, of the 14 animals detected positive for *T. congolense* using either the BCT or the MHCT, none could be confirmed with the Ag-ELISA. Of the 92 animals found to harbour *T. vivax*, 41 were detected using parasitological techniques, 48 by using the Ag-ELISA and only three were positive in both techniques. On the other hand, the majority of the *T. brucei* infections were diagnosed using the Ag-ELISA (Table VI).

TABLE VI. COMPARISON OF THE NUMBER OF SAMPLES DETECTED POSITIVE USING PARASITOLOGICAL TECHNIQUES AND ANTIGEN ELISA*

Trypanosome species	Parasiological techniques	Ag-ELISA	Parasit. tech. & Ag-ELISA	Total
T. brucei	7 (9.46%)†	66 (89.19%)	1 (1.35%)	74 (100%)
T. congolense	14 (100%)	0 (0%)	0 (0%)	14 (100%)
T. vivax	41 (44.56%)	48 (52.17%)	3 (3.26%)	92 (100%)

* Total number of samples examined = 1318.
† = between brackets: the percentage of samples detected positive with the technique as compared to the total number of samples found infected with the particular trypanosome species.

4. DISCUSSION

The three trypanosome species pathogenic to cattle in subSaharan Africa were detected in both tsetse infested and "tsetse free" areas of the North Province of Cameroon. The prevalence of *T. congolense* was low in either one of the areas, but significantly higher in the tsetse infested area (1.95%) than in the tsetse free area (0.16%). The prevalence of *T. brucei* was similar in both areas (6%). On the other hand, the prevalence of *T. vivax* was higher in the tsetse free area (8.9%) than in the tsetse infested area (5%). The relatively low trypanosome prevalence rates found in the tsetse infested areas could be explained by the fact that every animal suspected of trypanosomosis is commonly treated with trypanocidal drugs. Nevertheless, the results show clearly that by using the Ag-ELISA in conjunction with parasitological techniques such as the BCT and the MHCT, it was possible to detect many more animals infected with trypanosomes and, thus, to increase the sensitivity of the diagnostic methods (Figs 3, 4 and 5). Furthermore, the results of the survey indicate that the southern part of the North Province of Cameroon, which was declared tsetse free in 1991, seems to be reinfested today [6]. Reinfestation likely occurred due to the presence of wildlife reserves which had not been subjected to tsetse contol methods. The finding of a prevalence rate of 5.58% for *T. brucei* detected in a "tsetse free" area should be corroborated by entomological investigations.

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